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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/567,650	SCHERER ET AL.	
	Examiner	Art Unit	
	MARIANNE L. PADGETT	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/17/06 & 2/9/06*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/9/6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. **Claims 11-16 & 20** are objected to under **37 CFR 1.75(c),** as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

It is improper for device claims to depend from method claims, since it is improper or nonstatutory to have a "combination" claim directed to both the method limitations & the apparatus. For purposes of examination over prior art, the preceding method limitations of the method claims will only be considered to the extent which they necessitate specific apparatus structure, where it is further noted that in the context as presently claimed, the device claims are not further limiting to the preceding method claims.

2. **Claims 1-20** are rejected under 35 U.S.C. **112, second** paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In independent **claim 1**, the preamble requires "depositing an amorphous layer containing **mostly fluorine** and carbon on a substrate..." (emphasis added), where it is uncertain as phrased whether the "mostly" applies only to the fluorine, or also to the carbon, thus is the substrate of unnamed material mostly being fluorinated, with a little carbon thrown in & no crystallization occurring or the surface becoming amorphous, or is amorphous layer of carbon fluoride or perfluorocarbon (polymer) being deposited, with few other elements in the deposit? Also, whether one considers "mostly" to be determined by relative numbers of F & C atoms to other atoms, or weight relative to other atoms, will make a difference to what the deposited composition "mostly" contains (e.g. hydrogen is very light, so would contribute little to a comparison based on weight, while a very small weight of hydrogen may be a relatively large number of hydrogen atoms). Note that in line 3, "said layer" has antecedents from "an amorphous layer" of the preamble, hence for all of the above reasons the scope of the deposited layer for

the claimed process is ambiguous or unclear. Also note that the vacuum mentioned in the preamble, is not actually required in the body of this process claim.

Use of **relative terms** that lack clear metes and bounds in the claims, or in a clear definition provided in the specification, or in relevant cited prior art, is vague and indefinite. In **claim 2**, see "**low**" describing "**the** low index exterior layer" (emphasis added, lacks any antecedent basis), which is relative as "low" implies a range whose scope is not set forth in the claim. It is noted that exemplary values of low refractive index are found on p. 1 of the specification, however examples are not considered to be definitions, thus do not provide clear scope for relative terms. In Analogously in **claims 7 & 19**, see "a low refractive index" &"**high**" in "a high refractive index", where is noted that the further limitation of "preferably of the type $ZrO_2/SiO_2/ZrO_2$" is a second narrower range, hence considered optional, thus only provides any definition for these relative terms with respect to this non-positively claimed option. Also analogous use of "low" in **claim 10**, as well as "to **improve**" describing "to improve the adhesion" which is a relative description that lacks any basis for comparison, as there's no indication of what original adhesion is being "improved" or what constitutes improvement (is an increase or decrease in the adhesion desired) or how or when such an improvement occurs.

In **claims 3 & 17**, since "at least one compound containing fluorine and carbon" does not have an article showing antecedent basis to the limitation introduced in the independent claim with the same phrasing, it is not clear whether or not it is intended to further describe the previously introduced limitation, or if it is requiring a second feed into the ion gun, except mixed with either oxygen or a rare gas. Dependent **claims 4 & 5** have analogous problems, in that the more specifically claimed compounds are not related to or said to be a further description of the initially introduced "at least one compound containing fluorine and carbon", thus their relationship is not clear as written.

Note with respect **claim 5**, which has multiple ranges of compounds claimed therein due to the use of "in particular", that the narrower range so indicated is considered optional. Furthermore, **as**

written the "in particular..." range appears to include "at least one rare gas" as being an "other fluorocarbon compound", which is clearly scientifically inaccurate, hence probably it was not applicants' intended meaning, so it appears that the phrasing needs further modification for clarity.

In **claim 7**, "the amorphous **external** layer..." (emphasis added) lacks proper antecedent basis due to inconsistent terminology, as dependent claim 2 from which claim 7 depends, describes the amorphous layer as being "the low index **exterior** layer" (emphasis added), thus creating a confusion of terminology. **Claim 19** has analogous problems.

Dependent **claim 8** appears to use improper antecedents terminology & inconsistent phrasing in stating "each *in vacuo* PVD step", which from context the examiner assumes is intended to mean essentially -- each of said vacuum PVD steps -- that would be consistent with the preceding terminology. Also see dependent **claim 18** within analogous issue with respect to "each deposition step".

In **claim 10**, which depends from claim 1, "the underlying layer of an antireflective stack" has no antecedent basis, and the relationship of the only layer present in independent claim 1, i.e. the "amorphous layer", has no clear relationship to "a low refractive index exterior layer", nor are any of these layers even associated with the "substrate" of the independent claim, hence this claim has no clear relationship to any limitations of the independent claim.

Given **claim 11**'s improper dependent on the method claim 1, it is uncertain what aspects of the method limitations applicants intend to effect structural limitations to this apparatus claim, such as whether the limitation of the method with respect to a beam of accelerated ions, is supposed to provide for further limitations than the device claims "an ion gun (1)"; or whether the gas or vapor limitations of claim 1 are supposed to further modify the feed means (7) of claim 11, etc. Furthermore, this device claim, while being dependent on independent claim 1, does not use antecedent basis phrasing, & employs reference numbers that refer to the figures defined specification, making the limitations as written not quite the same as introduced in the independent claim (i.e. the relationship is less than clear), with it noted

that p. 6, line 28+ refers to "a Mark II ion gun 1 from Commonwealth Scientific comprising a fixed magnet 6...", and while use of reference numbers in the claims is not necessarily incorrect, it becomes uncertain whether applicants' use of the ref.# 's intending to read limitations from the specification into the claims. For purposes of examination over prior art the ref.# in the claims will not be considered to read any limitations into the apparatus claims; and the apparatus of claim 11 will be considered to require only an ion gun, with means for feeding gas or vapor into the gun, where the gun is below a substrate holder. Note that purely method limitations, such as the particular gas or vapor are not considered to provide any structural limitations to an apparatus, unless the method limitations necessitate some specific structure, and that an independent apparatus claim will not derive the benefit of independent claim 1's recitation of gas or vapor.

With respect **claim 12**, the meaning of "a filamentary cathode (5) extending **diametrically** above the annular anode" (emphasis added) is ambiguous or of uncertain scope, because the use of "diametrically" as an adjective could have several different meanings, since "diametrical" is defined to mean of, relating to, or constituting a diameter (located at the diameter); or completely opposed, as in being at opposite extremes or in contradiction. Thus in the present context, a filamentary cathode might be required to be a circular filament of approximately the same diameter as the annular anode, or it could be a filament that extends across the diameter, where this terminology could be read to mean that it is the same length as the diameter, are could be a read to mean that extends across further but than the diameter, etc., hence the uncertainty in scope.

It is noted that with respect the **scope** of claim 15, that "a cold trap" is taken as an art recognized term for a device that removes various gas or vapors due to temperatures low enough to condense them, thus it is considered that the requirement "adapted to increase the water pumping rate" is requiring the capability of the cold trap to produce temperatures capable of freezing water vapor out of the atmosphere

being treated at the operating pressure, hence in this context "cold" is not considered a relative term. Note that a capability does not require actual use.

With respect **claim 16**, "**the materials** to be deposited" (emphasis added) lacks any antecedent basis, thus is vague and indefinite with respect to preceding limitations. Furthermore considering the dependence on claims 11 & 1, if one considered the only deposition discussed therein, i.e. depositing an amorphous layer containing... fluorine and carbon", this claim would appear to be requiring that the gas or vapor supplied to the ion gun be done via electron beam evaporation, however figure 1 which shows reference #12, used as part of the description of "an electron gun (12)" in claim 16, has no connection to ion gun (1) or its feed system, indicating a further lack of clarity in this claim, as written. It is noted that similar phrasing, with similar lack of clear association with respect to the device may be found on p.6, lines 14-16.

3. The **disclosure** is **objected** to because of the following informalities: Applicants' specification in lacks appropriate section headings.

Appropriate correction is required.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following **sections** in order. Each of the lettered items should appear in **upper case**, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.

(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

4. The following is a quotation of the appropriate paragraphs of **35 U.S.C. 102** that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> **(b)** the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of **35 U.S.C. 103(a)** which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The **nonstatutory double patenting** rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. **Claims 1 & 4-5** are rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Hyodo** (2003/0148102 A1).

Hyodo (abstract; figures 4 & 7; [0010-12]; [0030-31]; & [0037-40, esp. 40]) teaches depositing a layer of amorphous fluorine containing inorganic carbon, as illustrated in figure 4 as only including C & F, via a process that employs an ion beam employing CF_4 gas, illustrated by ion gun 58 & ion beam 57, where figure 7's ion gun shows a typical cross-section of an annular anode & filament cathode, with a gas input port, which in combination with the arrow indicating ion beam 57 is considered to read on a beam of accelerated ions as claimed. Also note that while figure 7 while not discussing a vacuum system or evacuation in the cited discussion thereof, illustrates the output from the chamber by an unnumbered arrow, which is consistent with applicants' implied but not necessarily claimed vacuum in their preamble.

It is noted that while the description of apparatus seven does not provide any explicit discussion of the orientation of the various features shown therein, [0037] discusses that the wafers may be fixed on holder 45 with adhesive, which in combination with the cross-sectional figure may imply that the substrate holder configuration is vertical to gravity & figure 7 is probably a view from above.

6. **Claims 1 & 3-5** are rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Chien-Shing et al**. (EP 0 942 072 A2).

Claims 3 & 10 are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Chien-Shing et al**. (EP 0 942 072 A2).

Chien-Shing et al. (abstract; col. 2, line 54; [0012-14], esp. col. 4, lines 41-44; [0015], esp. col. 5, lines 25-27; [0027-28], esp. col. 6, line 54-col. 7, lines 11 & 17-20; [0030]; [0034-36], esp. col. 9, lines 25-35; and claims, esp. 1, 3 & 5) teach ion beam deposition of fluorinated diamondlike carbon (FDLC), which may be amorphous, via an ion beam deposition process that employs high vacuum conditions (e.g. 10^{-4} ~10^{-5} Torr) may employ single or plural ion sources of C & F or gaseous halocarbon or solid fluoropolymer source materials may be employed, noting that previously mentioned ([0008]) fluorocarbon sources include CF_4, C_2F_6 & C_4F_8., give a context to the taught gaseous halocarbon that may supply both C & F. It is also taught that inert gas ions such as Ar^+ or Kr^+ may be employed during the ion beam deposition in order to assist in attaining desired sp^3 structure, where [0028] discusses the inert gas ions as supplied from a separate ion source, however the claims are inclusive of claimed inert gas (e.g. rare gas) ions plus C & F ions all coming from a single source, thus the reference may be considered to applicant's claim of feeding at least one rare gas to the ion gun in the mix containing F & C. Alternatively, as this combination is not explicitly set forth in the body of the references specification, it would also have been obvious to one of ordinary skill in the art that given the claims & teachings, specifying single ion source & with the specific reason for employing inert gas ions, and the general knowledge of one of ordinary skill in the art that inert gas is conventionally & typically employed as a carrier gas for vaporized material, such as taught halocarbon (e.g. fluorocarbons), it would have been obvious to one of ordinary skill in the art to employ inert gas as part of the gaseous mixture when using the taught single ion source, as such is consistent with the overall teachings therein, with reasonable expectation of producing taught results.

Chien-Shing et al. also teach that as their deposition techniques for FDLC layers produces relatively low stress, this low stress improves the adhesion to substrates, such as silicon, silicon dioxide, Al, TiN, & glass, by reducing the tendency of the layer to delaminate from the substrates (e.g. increases adhesion), with increasing fluorine concentration tending to decrease stress, thereby improving the adhesion with respect to films with more stress. While applicants' claim 10 as written is not clear, without a clear connection to either deposits or the substrates of the independent claim, or a clear scope of what is meant by "improve the adhesion", this teaching concerning relative improved or increased adhesion has relevance to the most broadly extractable meaning of this claim, where one of ordinary skill in the art would further notice that materials listed therein to which adhesion is improved are generally old & well known to be relevant to antireflection films.

7. **Claims 1 & 3-6** are rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Veerasamy** (WO 01/36342 A2).

Veerasamy ((WO): abstract; figures 1-3, 9-10 & 13; p. 1, 2nd ¶; p. 6, last ¶; p. 8, lines 21-24; p. 11-12, bridging ¶; p. 13, lines 1-5, 14-19 & 22; p. 16, lines 18-p. 17, line 12; p. 20, 2nd ¶-¶ bridging to p. 21; p. 25, line 6-end of page; p. 26, all; p. 27 first ¶; p. 28, line 3-p. 29, line 14; p. 31, lines 3-p. 32, line 16, esp. p. 31, lines 15-17 & p. 32, lines 4-11; p. 36, sample #1) deposition of a hydrophobic highly tetrahedral amorphous diamondlike carbon coating via a plasma ion beam, which may include fluorine to improve the hydrophobicity and compositions of ta-C:SiO:F, which as exemplified by sample number one on page 36 may be 54.6 at.% C +1.2 at.% F, thus is "mostly" F + C. The plasma apparatus as illustrated by figures 10 & 13 include ion beams that may be considered to be an "ion gun" & clearly accelerate ions, which has indicated on page 32 may come from CF_4 or CF_6 (e.g. C_2F_6 ?) gases, and as indicated on page 25, 26, 28, etc. the gas composition for the plasma ion beam may also include oxygen &/or argon in the overall reagent mixture for depositing the DLC based coating. Substrates to be deposited on include glass or plastic, with mention of use on substantially transparent plastic, or for

example on automotive windshields that are combination of glass substrates laminated to plastic substrates, and the taught DLC coatings that may include fluorine may be deposited as a top protective coating on underlying "low-E" coating (13 US patents incorporated by reference to to show such exemplary coatings, with use of silicon oxide &/or silicon nitride coatings specifically mentioned, page 17), where the resultant coated articles preferably have visible light transmission greater than 80 % (page 20), where the inclusion of F is taught to be employed to effect the refractive index in order to improve transmission.

8. **Claim 10** is rejected under 35 U.S.C. **103(a)** as being unpatentable over **Veerasamy** (WO), as applied to claims 1 & 3-6 above, and optionally further in view of **Chien-Shing et al**. (EP 0 942 072 A2).

Veerasamy (WO) does not appear to discuss improved adhesion per se, however as discussed above, claim 10 is too vague to clearly say how or in what way any coatings adhesion is improved, hence the lack of any significant difference between the teaching of Veerasamy & the present claims may be considered to inherently provide the claimed "improvement", optionally especially in view of **Chien-Shing et al**. as discussed above (section 6) provides showing of why fluorinated carbon ion beam deposition consistent/analogous with that described by Veerasamy (WO) has adhesion advantages, as the use of fluorine in analogous deposition techniques tends to decrease the stress, which in turn decreases delamination or increases adhesion, thus showing why one would have reasonably expected improved the adhesion with respect to films deposited with higher stress or without the claimed & taught fluorine usage.

9.

Claims 2, 6-9 & 17-19 are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Veerasamy** (WO) or **Chien-Shing et al**. (EP 0 942 072 A2), as applied to claims 1, 3-6 & 10 above as appropriate, and further in view of **Knapp et al**. (6,077,569).

While either of the primary references, **Veerasamy** (WO) or **Chien-Shing et al.** (EP) are directed to deposition of amorphous C & F containing protective topcoats that may be employed on optical substrates, neither reference has discussion of static antireflective coatings per se, deposited via PVD techniques, however **Knapp et al.** ((569): abstract; figure; col. 1, line 34-col. 3, line 37 & 65-col. 4, line 16; col. 6, lines 25-56; col. 7, lines 34-47; col. 8, lines 15-37 & 53-65+; col. 11, esp. lines 35-45 & 52-65) teach that dielectric coatings are commonly applied to plastic & glass substrates to achieve a variety of optical effects, where antireflective coatings (AR coatings) are one of the most comment typical optical coatings, employing a multilayer coating structure composed of alternating layers of dielectric materials with relatively high refractive indexes & relatively low refractive indexes. Knapp et al. teach typical dielectric materials for such optical coatings, mentioning silica dioxide having n = 1.46, zirconium oxide with n = 2.05 & DLC with controllable refractive index between 1.7-2.2, all useful in an AR coating stack. Knapp et al. further teach that is known to employ DLC deposited via direct ion beam deposition processes as top protective coatings on such AR stacks, where the prior art deposits AR coatings via various PVD techniques, such as electron beam evaporation or ion beam assisted electron beam evaporation, etc., but where improvement is still needed, especially with respect to plastic substrates for the deposition these coatings in order to provide a highly durable & abrasion resistant antireflective coatings on various optical substrates. Knapp et al. is teaching various abrasion resistant coatings & composite coatings deposited via plasma ion beam techniques using reactive precursor compositions & high vacuum, including topcoats of amorphous DLC, having high hardness, low friction coefficients, transparency across a majority of the electromagnetic spectrum & chemical inertness, where the DLC may also be doped with other atoms, mentioning N & Si. Knapp et al. notes that while evaporation & sputtering sources are not shown in their figure 1 plasma ion beam apparatus schematic, that such sources can be readily integrated therein (col. 8, lines 53-57).

It would have been obvious to one of ordinary skill in the art, given the teachings of Knapp et al. with respect to the desirability of DLC coatings as protective coatings for optical substrates inclusive of those having AR coatings, to employ such AR coatings deposited by conventional PVD techniques on the optical substrates of Veerasamy or Chien-Shing et al. before deposition of their taught protective amorphous DLC & F containing coatings, as Knapp et al. shows both the expected effectiveness & desirability of the AR coatings with analogous DLC protective coatings. It is further noted that Veerasamy may be considered to further show expected effectiveness, as their DLC coatings may or may not contain fluorine, while alternatively Chien-Shing et al. provide reasons why the inclusion of fluorine in the DLC coating provides better adhesion due to reduce stress, thus providing particular motivation to employ fluorine as dopant atoms in the DLC structure, in order to provide improved adhesion, which Knapp et al. notes is needed & desirable.

10. **Claims 11 & 16** are rejected under 35 U.S.C. **102(b)** as being clearly anticipated by **Ahn et al**. (2003/0003702 B1 or WO 02/065573 A2).

Ahn et al. ((702): figure 3; [0038-58], esp.[0039], [0046], [0047], [0049] & [0057]) teach an apparatus with an ion gun (120) fed by an ion gas source (122), used in conjunction with an electron beam evaporation apparatus (74) with electron gun (104), positioned in a vacuum chamber underneath the substrate assembly ((62) e.g. substrate holder). The use usefulness of any suitable type of ion gun is taught, with mention of Kaufman-type ion guns & filament-type ion guns, but their internal details are not provided. Although applicant's claim 16 as written is vague as to how the ebeam evaporation system relates to the ion gun, the apparatus of Ahn et al. reads on possible meanings encompassed thereby. Note that **Ahn et al**. (WO) has analogous teachings to (702).

11. **Claims 12-14 & 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ahn et al**. (2003/0003702 B1 or WO 02/065573 A2), as applied to claims 11 & 16 above, and further in view of **Sainty** (WO 00/05742) or **Kaufman et al**. (EP 0265365 A1).

While **Ahn et al**. references do not teach the details of their preferred filament type ion gun, **Sainty** (abstract; figure 3 page 1, lines 9-13 & page 4, line 15-page 5, line 17) provide details with respect to an ion source, teaching cathode filament 11, annular anode 12, magnet 14, plus gas feedline 22 having out let 15, with a plurality of apertures 17 (i.e. gas distributor) in the claimed configuration, and intended to be employed in an evacuated chamber. It would have been obvious to one of ordinary skill in the art given the expressed preference of Ahn et al. to employ a filament type ion gun, to use one such as taught by Sainty, as it is a exactly what the primary reference stated to prefer, thus reasonably expected to be affected therefore. Note while neither Ahn et al. or Sainty specifically mentioned a pumping system, they do specifically require use of vacuum, i.e. an evacuated chamber, thus one of ordinary skill in the art would reasonably have expected to employ a conventional pumping system to effect the taught low pressure requirements.

Note analogous teachings to those set forth in Sainty are present in **Kaufman et al**. (abstract; figures 1-3; col. 3, lines 20-col. 4, line 7 & 20-58; col. 5, lines 33-54+; col. 10, lines 6-44), noting discussion that the ion source may be oriented in any relative direction, hence the same reasons for obviousness apply for Kaufman et al. as for Sainty.

12. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ahn et al**. (2003/0003702 B1 or WO 02/065573 A2), in view of **Sainty** (WO 00/05742) or **Kaufman et al**. (EP 0265365 A1), as applied to claims 11-14, 16 & 20 above, and further **Knapp et al**. (6,077,569).

As these references do not detail there vacuum evacuation system, whether or not they employ a cold trap is not stated, however cold traps are conventionally used for vacuum evaporation systems, including those intended for use with ion beams, as shown by **Knapp et al**. (col. 6, lines 35-54), who employs a cryogenic pump, mentioning use of a diffusion pump with a cryogenically cooled trap at the inlet for pumping water vapor, which is a preferred high vacuum pumping arrangement, hence it would been obvious to one of ordinary skill in the art to employ such conventional vacuum pumping systems

that are old and well-known in the vacuum art, with the reasonable expectation that they will provide suitable vacuum conditions in the above combination of references.

13. **Claims 1-10 & 17-19** are provisionally rejected on the ground of **nonstatutory obviousness-type double patenting** as being unpatentable over claims 1-2, 4-14 & 26-29 of copending Application No. **10/569,406**, in view of **Veerasamy** (WO 01/36342 A2), optionally considering **Chien-Shing et al**. (EP 0 942 072 A2) for claim 10.

The copending claims are directed to overlap in subject matter, where both may be depositing a low index layer on the surface of a multilayer stack of antireflective films that may be " $ZrO_2/SiO_2/ZrO_2$" via PVD, employing like pressures, where the present claims required to deposit the amorphous, "containing mostly fluorine and carbon" & be deposited via a beam from an ion gun using a F + C compound gas or vapor fed to the gun, while the copending (406) requires the more generic physical vapor deposition (PVD) where a mixture of fluorinated polymer in deposition material & in the deposit (e.g. includes F + C), plus silica or magnesium fluoride, where the volume percentage of fluorinated polymer may be up to 80 %, thus this is considered to encompass the presently claimed "mostly...", as it would reasonably include anything greater than 50% or the like. Copending claims 9-10 suggests use of the perfluorinated compound tetrafluoroethylene (i.e. excludes inclusion of hydrogen in this polymer's volume) & amorphous copolymer structure, thus providing further overlap, while copending claim 11 requires the substrate to be organic material, which in the claims context of an optical substrate would have been considered to have obviously overlapped or be consistent with the present claims 6 requirement of a plastic substrate, since virtually all optical organic substrates are plastic.

The two sets of application claims differ by the present claims specifying the use of an ion gun, however **Veerasamy**, as discussed above in sections 7-8 is depositing an outerlayer protective coating with a "low index" via a physical vapor deposition process that is specifically taught to be via ion beam, i.e. ion gun, where the deposition material has compositions relevant to both applications' ranges of

materials, hence demonstrating expected effectiveness & analogous use of like materials deposited specifically via the PVD techniques employing an ion beam to effect deposition. Note as claim 10 is too vague to clearly say how or in what way any coatings adhesion is improved, hence the lack of any significant difference between copending (406) in view of Veerasamy & the present claims may be considered to inherently provide the claimed "improvement", or alternatively Chien-Shing et al. as discussed above (sections 6 & 8) provides showing of why fluorinated carbon ion beam deposition as described by this combination has adhesion advantages, thus showing why one would expect improved the adhesion with respect to films deposited with higher stress.

This is a provisional obviousness-type double patenting rejection.

14. **Other art** of interests includes: **Veerasamy et al**. (5,858,477) incorporated-by-reference in Veerasamy (WO) discussed above for various alternative ion beam apparatus useful for depositing highly tetrahedral amorphous carbon & **Hartig et al**. (5,376,455) also incorporated-by-reference in Veerasamy (WO) for examples of useful multilayer "Low-E" optical coatings.

15. **Any inquiry** concerning this communication or earlier communications from the examiner should be directed to **Marianne L. Padgett** whose telephone number is **(571) 272-1425**. The examiner can normally be reached on M-F from about 9:00 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/
Primary Examiner, Art Unit 1792

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